

Claims:

- 1. Method for manufacturing parts with intimate connection of least two material phases, of which at least one is a solid body phase, and in which method, prior to intimate connection, at least the surface of the solid body phase to be connected is pretreated, characterized in that the pretreatment is performed by means of a plasma-activated gas that contains nitrogen.**
- 2. Method according to Claim 1, characterized in that the pretreatment is performed by means of a plasma-activated gas that contains hydrogen .**
- 3. Method according to one of Claims 1 or 2, characterized in that the plasma discharge is produced as a low-voltage discharge, preferably from a thermionic electron-emitting cathode.**
- 4. Method according to one of Claims 1 to 3 characterized in that the pretreatment is performed by means of plasma-activated gas that contains primarily nitrogen.**
- 5. Method according to one of Claims 1 to 4 characterized in that the pretreatment is performed by means of plasma-activated gas that contains a working gas, preferably a noble gas, especially preferably argon.**
- 6. Method according to one of Claims 1 to 5 characterized in that the (at least one) solid body surface to be intimately connected is metallic and/or semi-metallic and/or ceramic and/or made of plastic.**
- 7. Method according to one of Claims 1 to 6, characterized in that the intimate connection is performed by gluing, soldering, welding, casting, or**

coating, especially vacuum coating, or by direct bonding.

8. Method according to Claim 3 characterized in that the low-voltage discharge is operated with a discharge voltage of 30 V or less and preferably with a discharge current between 10 A and 300 A. (including both limits).

9. Method according to one of Claims 1 to 8, characterized in that the (at least one) solid body surface to be connected is exposed to air following pretreatment and before its intimate connection.

10. Method according to one of Claims 1 to 9, characterized in that the intimate connection is performed by ultrasonic welding.

11. Method according to one of Claims 1 to 10, characterized in that at least the one solid body phase is stored during pretreatment in a holding device which defines access areas on the surface that are narrow relative to the plasma discharge chamber.

12. Method according to Claim 11, characterized in that the (at least one) solid body phase is formed by a disk-shaped or plate-shaped substrate and the holding device has at least one access slit therefor.

13. Method according to Claim 12 characterized in that a magazine (12) with a plurality of access slits is used as the holding device.

14. Method according to one of Claims 1 to 13 characterized in that the intimate connection is made in air, preferably at a maximum solid body temperature of 150°C.

15. Use of the method according to one of Claims 1 to 14 for connecting integrated circuits with an HLST or for the electrical connection of the printed circuits by wire bonding or for the sheathing of electrical circuits joined with HLST and connected by wire bonding, with a potting compound.
16. Use of the method according to one of Claims 1 to 11 for integrated circuits that are to be connected flip-chip and to be positioned, as well as HLST, by melting the soldering points of the circuit and the HLST.
17. Use of the method according to one of Claims 1 to 13 for workpieces with surfaces to be connected intimately with poorly accessible surface areas, especially edges, holes, blind holes, gaps, and grooves.
18. Use of the method according to one of Claims 1 to 13 for chips with copper traces.
19. Workpiece stored in air, characterized in that its surface exposed to the air, by contrast with a surface of the workpiece produced directly, has an elevated nitrogen concentration, detectable for example by a "Fourier transform infrared spectroscopy" with "attenuated total reflection" FTIR-ATR and/or with "nuclear reaction analysis," NRA and/or with "time of flight secondary ion mass spectrometry," TO-SIMS.
20. Vacuum processing chamber with a plasma discharge section, a gas supply to the chamber, connected with a gas tank arrangement, as well as with a workpiece holding device, characterized in that the gas tank arrangement contains a gas with nitrogen and the holding arrangement comprises at least one access slit open to the discharge chamber for a disk-shaped or plate-shaped workpiece.

21. Processing chamber according to Claim 20 characterized in that the plasma discharge section is a low-voltage discharge section, preferably with an electron-emitting hot cathode and/or in that the gas in the gas tank arrangement contains hydrogen and/or a working gas, preferably at least a noble gas, especially preferably argon, preferably nitrogen in a predominant quantity.

22. Chamber according to one of Claims 20 and 21 characterized in that the workpiece holding device is a magazine with stacked access slits.

[On the drawings:]

Versuche I = Tests I

Versuche II = Tests II